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To: G. D. McGhee cc: L. Watson
R. Danta

Date: 28 October 1968

Subject: Work Statement Review

From: R. R. Wolfe

The following are recommended changes to the contractor's statement of work.

3.2.1.3.11 - Fire and Contamination Hazards

Delete as written and substitute the following:

Potential catastrophic fires shall be eliminated by minimizing the quantity of flammable materials, limiting ignition sources adjacent to flammable materials, and limiting potential flame propagation paths. SAFSL Exhibit 10010 shall be used as a guide. This activity shall include:

- a. Utilizing existing nonmetallic materials test data (NASA Report MSC-NA-D-68-1) dated 15 February 1968 identify segment peculiar nonmetallic materials that require sample testing. The resulting list of identified peculiar nonmetallic materials requiring sample testing will be forwarded to GE and MDAC with a copy to the MOL SO. MDAC will compare these identified materials with those of other segment contractors and will provide a single defined list of MOL nonmetallic segment contractors and a single defined list of MOL nonmetallic materials to be tested by NASA WSTF. These shall be identified according to when test data are required.
- b. The MOL SO will select from the MOL list prepared by MDAC, in accordance with Paragraph 1 above, those materials for which each individual segment contractor shall provide test samples to NASA WSTF for testing. The contractor shall plan for the preparation and submittal of test samples to NASA WSTF at the direction of the MOL SO.
- c. The contractor shall identify the requirements for special tests as defined in SAFSL Exhibit 10010. If required, the contractor may conduct exploratory component tests and may acquire special test equipment required to project timely conduct of testing. Justification for such tests and equipment acquisition shall be provided to the MOL SO.

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- d. The contractor shall identify with the attendant rationale the requirements for full-scale mockup flammability verification testing. If the contractor ascertains that no full-scale testing is required, it should be so stated with supporting justification.
- e. The contractor shall prepare an implementation plan in accordance with Attachment A and accomplish the effort necessary to comply with the approved plan.
- f. Contractor submittal items are as follows:
 - (1) Nonmetallic Materials Plan
 - (2) Nonmetallic Materials Program Special and Full-Scale Test Description.
 - (3) Nonmetallic Materials Program Identification of Special Tests Required at MDAC.

3.6.1

Correct last paragraph to MIL-S-38130A dated 6 June 1966

3.6.2 - System Safety Engineering ** at the MPS Level

Add the following:

3.6.2.1 - System Safety Reports

Add the following:

3.6.2.1 - System Safety Reports

- 1) System Safety Plan (SSP) - Update
- 2) Hazards Reports
- 3) Accident/Incident Reports
- 4) Safety Program Summary Report

3.12.5 - System Safety Engineering Plan

Delete as this is covered above.

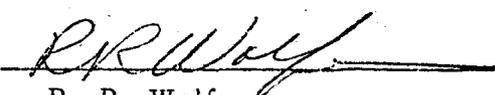
Attached are the seven form 9s for the required data submittals and a copy of the Roles and Responsibilities Guide.

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RRW/TDC:md.

Attachments:

As Stated Above (Under Separate Cover)


R. R. Wolfe

ROLES AND RESPONSIBILITIES GUIDE

1. DAC shall be responsible for accounting and identifying all nonmetallic materials including GFE in the Laboratory Module. DAC shall be responsible for all interface analysis relative to nonmetallic materials installed within the Laboratory Module supplied by other associate contractors.

2. GE shall be responsible for accounting and identifying all nonmetallic materials including GFE in the Mission Module.

3. MAC shall be responsible for accounting and identifying all nonmetallic materials including GFE in the Gemini B. MAC shall also be responsible for all interface analysis relative to nonmetallic materials installed within the Gemini B supplied by other associate contractors.

4. Hamilton Standard shall be responsible for accounting and identifying all nonmetallic materials including GFE in the Pressure Suit Assembly. HS shall also be responsible for all interface analysis relative to nonmetallic materials installed within the Pressure Suit Assembly supplied by other associate contractors.

5. Each associate contractor who supplies nonmetallic materials to be installed in another Contractor's Segment shall be responsible for the conformance of his nonmetallic materials. Data required for all interface analysis shall be provided to the integrating Contractor performing the analysis.

6. NASA WSTF will conduct the screening tests (MOL Tests 1 through 6 of SAFSL Exhibit 10010) for MOL.

7. Each MOL Contractor shall define the special tests required (as defined in SAFSL Exhibit 10010).

8. DAC and MAC will perform full-scale mockup flammability verification tests if required. GE and other designated contractors will determine their requirements for full-scale tests which are to be performed by DAC and MAC. In addition, GE and other designated contractors will determine individual configuration tests required to be performed by DAC. GE and other designated Contractors shall provide the test article(s) and the necessary test support as required.

Roles and Responsibilities Guide

9. MOL SPO Directorate of System Integration will delineate MOL testing requirements with NASA MSC/WSTF.

10. Only DAC will establish an integrated Materials Information Desk. This desk will be a focal point of reference information for all nonmetallic materials. This desk shall also provide a current listing of information on flammability and toxicity of nonmetallic materials information, screening tests and special test results to all other MOL Contractors. Each Contractor will provide a point of contact with and provide full support for the Materials Information Desk.

11. GE shall identify the support required from the Associate Contractor to perform the tasks to be defined in the proposed implementation plan. This required support shall be incorporated into the proposed implementation plan to be prepared and submitted by GE.

3. 12. 69

Attachment A

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| <p>TITLE</p> <p>Nonmetallic Materials Implementation Plan</p> | <p>NUMBER</p> <p>US-417</p> |
| <p>PURPOSE</p> | <p>DATE</p> <p>1 June 1968</p> <p>RESPONSIBLE COMMAND</p> <p>DDC REQUIRED</p> <p>APPROVAL LIMITATIONS</p> |
| <p>APPLICATION</p> <ol style="list-style-type: none"> 1) SAFSL Exhibit 10010 to be used as a guide. 2) Relationship of SAFSL Exhibit 10010 to other documents (e.g. SAFSL Exhibit 14002). 3) Nonmetallic materials analysis and testing interfaces. | <p>APPROVAL DATE</p> <p>REFERENCES (Non-contractual)</p> |
| <p>PREPARATION</p> <p><u>SECTION 1 - INTRODUCTION</u></p> <p>This section will include only that information necessary to ensure understanding by the top level management officials at policy and decision making levels of the key features of the Contractor's effort. The following specific considerations will be reflected in this section:</p> <ol style="list-style-type: none"> A) A summary of the key objectives of the implementation plan. B) Brief summaries of the sections contained within the plan. C) A summary of the interrelationship of the plan with the tests required by SAFSL Exhibit 14002. <p><u>SECTION 2 - MANAGEMENT</u></p> <p>This section will be prepared to provide a summary of how the Contractor intends to manage the implementation of his nonmetallic materials program. Describe in detail the interface and the use of the DAC nonmetallic Materials Information Desk as specified in Attachment C.</p> <p><u>SECTION 3 - DOCUMENTATION REQUIREMENTS</u></p> <p>In this section the Contractor shall prepare, if required, separate AFLC/AFSCN Form 9 reports for each document he proposes for addition to the "Contractor Data Requirements List (CDRL)" Form 1423. This section shall also include a list of documents that will be either deleted or superseded and that will require appropriate Contract Change Notices.</p> | |

~~Attachment A~~

Title

Nonmetallic Materials Implementation Plan

SECTION 4 - TECHNICAL SUPPORT

4.1 The Contractor shall provide a description of the approach he intends to utilize in analyzing his end item for fire/contamination safety including a schedule of the activity.

4.2 In this section the Contractor shall present a summary of the tests planned, a brief description of the test setup and a preliminary schedule.

4.3 In this section the Contractor shall describe how he intends to support nonmetallic materials analysis and testing when nonmetallic materials fabricated by him are to be installed into another Contractor's deliverable end item.

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| TITLE Nonmetallic Materials Program - Special and Full-Scale Test Description | NUMBER UT-464 |
| PURPOSE To plan and conduct full scale flammability mockup test(s) of critical areas and configurations with questionable propagation paths. | DATE 1 June 1968 |
| | RESPONSIBLE COMMAND |
| | DDC REQUIRED |
| | APPROVAL LIMITATIONS |
| APPLICATION Full scale flammability testing of critical areas and configurations. | APPROVAL DATE |
| | REFERENCES (Non-contractual) |
| PREPARATION The plan as a minimum should contain the following: <ul style="list-style-type: none">a) Test Objectivesb) Test Configurationsc) Requirements for Test Shell Configurationd) Parameters to be Measurede) Test Instrumentationf) Site at Which Test will be Conductedg) Test Article Configuration Controlh) Ancillary Equipment Requiredi) Testing Schedulej) Reportingk) Estimated cost for each test. <p>In preparing this plan, the Contractor shall consider configurations with critical areas and questionable propagation paths. The equipment(s) to be tested shall be identical to flight article, except where the assemblies contain high dollar value articles which would not necessarily provide a flame propagation path. In those cases only nonmetallic parts shall be identical. These parts can be simulated with respect to mass and geometry. The selected flight configurations shall be predicated upon "worse case" installations with regard to anticipated propagation paths. In planning these tests the following rules shall apply:</p> <ul style="list-style-type: none">a) Ignition shall first be attempted by means of a deliberate electrical circuit overload of the most susceptible installation. | |

Preparation (Continued)

b) If ignition does not occur from a deliberate electrical circuit overload, ignition shall be accomplished by an external ignition source, i.e., nicrome wire, external to the more combustible material in the test configuration.

c) A system shall be designed into the mockup so that a conflagration is prevented. If ignition occurs, the combustion should be allowed to sustain itself for a sufficient period of time to record data necessary for evaluation of the test. Tests to destruction shall not be allowed. Maximum effort should be made to salvage components for further testing if required.

d) If contiguous components or components in proximity to the test article are not flammable and will not impair test data, they may be simulated.

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| TITLE IDENTIFICATION OF SPECIAL TESTS REQUIRED AT DAC | NUMBER UT-434 |
| PURPOSE To plan the conduct of flammability tests for selected nonmetallic materials configurations. | DATE 1 June 1968 |
| | RESPONSIBLE COMMAND |
| | DDC REQUIRED |
| | APPROVAL LIMITATIONS |
| APPLICATION Aid in the conduct of the testing delineated in SAFSL Exhibit 10010. | APPROVAL DATE |
| | REFERENCES (Non-contractual) |
| PREPARATION In the preparation of this plan, the Contractor should, as a minimum, include the following: <ul style="list-style-type: none">a. Items to be Tested Including GFEb. Objective of Testsc. Parameters to be Measuredd. Test Instrumentatione. Schedule for Conduct of Testsf. Reporting | |

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| TITLE SYSTEM SAFETY PLAN (SSP) | NUMBER US-101 |
| PURPOSE To explain how the contractor will maintain a comprehensive over-view of system safety throughout system acquisition. The SSP will detail the methods to be used to identify, evaluate, and resolve system safety problems, from contract award throughout the contractual cycle including tests, update, modification, maintenance, and operational tasks as appropriate or required. | DATE 5 September 68 |
| | RESPONSIBLE COMMAND |
| | DOC REQUIRED |
| | APPROVAL LIMITATIONS |
| APPLICATION | APPROVAL DATE |
| | REFERENCES (Non-contractual) |
| <p>PREPARATION</p> <p>The System Safety Plan will contain, but is not limited to, the following:</p> <ol style="list-style-type: none"> 1. APPLICABLE DOCUMENTS. List documents which will be applied either as directives or guidance in the conduct of the system safety program. 2. PURPOSE. State the purpose of the system safety program and the principles which will be observed in achieving that purpose. The statement should clearly indicate that system safety will be applied from earliest design phases to final delivery. 3. ORGANIZATION. Describe the organizational placement and manning of the contractor's system safety organization. Use charts to show organization and functional relationships. This section should demonstrate that the system safety function is organizationally placed and manned to enable timely influence on design, development, test, and construction. 4. SAFETY PROGRAM. State the extent of the planned safety effort - i. e., "conceptual through operational phases." Use charts or other appropriate means to show the detailed sequence and gradual expansion of the safety effort as well as the safety activities to be performed in each phase of the program. | |

D

Preparation Information (Continued)

5. **DATA FLOW.** Illustrate the basic data flow which will ensure that the system safety organization will maintain a continuous over-view of all activities and be enabled to suitably influence decision making.
6. **SYSTEM SAFETY FUNCTIONS.** Show the principal functions of the system safety organization and the specific tasks which will implement each function. Give detailed procedures in at least the following areas:
 - a. Safety Analyses. Describe methods to accomplish qualitative and/or quantitative analyses and to classify hazards of components, subsystems, and the total system. (MIL-S-38130).
 - b. Post Analyses Actions. Describe methods (MIL-S-38130) which will be used to eliminate or reduce the classification of hazards. Detail those areas in which a specific hazard category will be achieved--i. e. , "Necessary action will be taken to ensure that the arming and fuzing subsystem fails in the 'safe' category."
 - c. Safety Reports. Show the schedule under which safety reports required by the Contractor Data Requirements List (CDRL) will be submitted to the procuring agency.
 - d. Review Functions. Describe review groups, boards and meetings in which the system safety organization will participate. Include Preliminary and Critical Design Reviews, System Safety Groups, System Safety Boards, and similar activities as appropriate. List other review activities such as reviews of safety standards and requirements, specifications, final drawings, proposed changes, AGE and operating procedures, system requirements for AVE, AGE, facilities, spares, technical manuals, test procedures, etc.
 - e. VAFB Safety. Describe actions to be taken to assure that safety is an integral part of all activities performed at VAFB.
 - f. Explosive and Ordnance Safety. Describe how the requirements which explosives and ordnance devices and systems will be required to meet will be verified and the methods to be used to ensure accomplishment of the tasks.
 - g. Ground Handling and Transportation. Describe the requirements and methods which will ensure safe ground handling equipment, facilities and procedures.
 - h. Relations with Other Contractors. Detail methods by which system safety efforts and requirements will be integrated and coordinated with vendors, subcontractors, associate contractors, and integrating contractors as appropriate.
 - i. Tests. Describe the methods to be used to ensure safe test procedures and provide necessary test results to the system safety organization.
 - j. Training. Describe the safety training to be provided for contractor employees and, when required, for operational Air Force personnel.

Preparation Information (continued)

k. System Installation. Describe the actions, procedures and organization which will ensure that system safety will not be degraded during installation and that the work will be accomplished with an optimum degree of safety for all personnel and equipment. This description should clearly demonstrate that management of an effective all inclusive on-site safety program will be an integral part of the contractor's total on-site management effort.

7. OTHER. Present such other information as the contractor deems germane or necessary to satisfy requirements of the Statement of Work or other contractual requirements. This information may include such areas as electro-explosive devices, electronics, mechanical, hydraulic, pneumatic, environmental, shock, vibration, electromagnetic radiation, chemical, biological and such other categories as are appropriate to the work effort.

8. UPDATING. State the methods by which the SSP will be updated as necessary.

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| <p>TITLE</p> <p>HAZARDS REPORTS 3.12.66</p> | <p>NUMBER</p> <p>US-45</p> |
| <p>PURPOSE</p> <p>To inform the procuring agency of Class III (Critical) and Class IV (Catastrophic) hazards identified in accordance with MOL-S-38130A analyses and recommended solutions/actions taken to eliminate or minimize these hazards.</p> | <p>DATE</p> <p>5 September 68</p> |
| | <p>RESPONSIBLE COMMAND</p> |
| | <p>DDC REQUIRED</p> |
| | <p>APPROVAL LIMITATIONS</p> |
| <p>APPLICATION</p> | <p>APPROVAL DATE</p> |
| | <p>REFERENCES (Non-contractual)</p> |
| <p>PREPARATION</p> <p>This report will be submitted at any time a hazard has been identified and validated or corrected by the contractor. A copy of the analysis which identified the hazard will be kept on file at the Contractor Safety Office for review by the MOL Systems Office.</p> <p>The hazards will be clearly described and will include recommended solutions or actions being planned to eliminate or reduce the hazards to an acceptable level. The impact of these hazards on the system, segment or an interface shall be identified. Recommended solutions or planned actions shall be substantiated by trade studies</p> <p>For hazards that will not cross/be propagated across segment interfaces, the schedule for reporting the probability that the hazard will occur during each mission phase will be included in the report.</p> <p>For hazards that may/will cross/be propagated across segment interfaces, the hazard parameters, including media of propagation, will be defined. The schedule for reporting the probability that the hazard will occur during each mission phase will be included in the report.</p> | |

Preparation, Cont'd

The hazards report will include the following information:

- (a) Description of the item analyzed (flight hardware, associated ground equipment, facility, procedure or personnel qualification)
- (b) Description of the hazard
- (c) The schedule for reporting the probability of occurrence
- (d) System exposure to the hazard
- (e) Corrective action recommendations
- (f) Estimated schedule for correction
- (g) Office responsible for corrective action

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| <p>TITLE ACCIDENT/INCIDENT REPORTS 3,12,67</p> | <p>NUMBER S-18-15.0</p> |
| <p>PURPOSE Used to assure that accidents or incidents which degrade the system or have a potential to do so are thoroughly investigated and that adequate corrective action is taken to preclude the possibility of recurrence during system acquisition and operation</p> | <p>DATE 15 Mar 1964</p> |
| | <p>RESPONSIBLE COMMAND</p> |
| | <p>DDC REQUIRED</p> |
| | <p>APPROVAL LIMITATIONS</p> |
| <p>APPLICATION 11.0, 17.0, 18.0, 28.0, 43.1, 56.0</p> | <p>APPROVAL DATE</p> |
| | <p>REFERENCES (Non-contractual) BSD Exh 62-41 BSD Exh 63-S BSD Exh 63-21 AFR 122-2 AFPI7-4001 AFR 127-4 MIL-S-38130</p> |
| <p>PREPARATION The contractor shall prepare Accident/Incident reports in the form prescribed by the contract or as informal letter reports. In-plant industrial accidents or incidents in production will <u>not</u> be included. A report will be submitted at each occurrence containing all pertinent facts reasonably available concerning each accident or incident within the meaning of AFR 127-4 which result in damage or injury with significant implications directly involving an aircraft, missile, space vehicle or major component thereof (as defined by agreement between the Contracting Officer and the Contractor) possessed, used or operated by or for the Contractor, which occurs during and as a result of the performance of work or services.</p> <p style="text-align: center;">C O P Y</p> | |

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| <p>TITLE QUARTERLY SAFETY PROGRAM SUMMARY REPORT</p> | <p>NUMBER US-</p> |
| <p>PURPOSE To provide a summary of safety activities including safety analyses which will be used by the MOL SO and other associate contractors to identify hazards especially those which cross interfaces.</p> | <p>DATE 5 September 68</p> <p>RESPONSIBLE COMMAND</p> <p>DDC REQUIRED</p> <p>APPROVAL LIMITATIONS</p> |
| <p>APPLICATION SAFSL 10032</p> | <p>APPROVAL DATE</p> <p>REFERENCES (Non-contractual)</p> |

PREPARATION

The Safety Program Summary Report shall be submitted on a quarterly basis. This report shall provide a complete accounting of progress accomplished and shall describe the status and results of safety tasks and analyses required by SAFSL Exhibit 10032. The report shall include but not be limited to the following:

- A. Safety Task and Analyses Status Summary -- This summary shall present tasks and analyses initiated during the last quarter, tasks and analyses completed, status of completion of tasks and analyses previously initiated but not terminated, significant results obtained, and the identification of documentation where further details can be obtained. It shall list hazard reports submitted during the period.
- B. Studies Status Summary -- Studies undertaken shall be described as to objectives, approach, and scheduled completion dates. Studies completed during the reporting period shall be summarized with respect to results, conclusions and recommendations, if any. Contractor documentation where further details can be obtained shall be identified.
- C. Safety Activities -- This section shall summarize the participation of contractor safety personnel in design reviews; design and specification changes; safety meetings, groups and boards both internally and externally; trade-off studies; preparation of test procedures; operating procedures, etc. Summaries of meetings shall include agreements reached, action items assigned and the status of open action items.

QUARTERLY SAFETY PROGRAM SUMMARY REPORT

Page 2

- D. Problem Summary and Status -- Problems shall be reported and summarized to include the following as a minimum:
- a) A statement of the problem and its origin.
 - b) The impact on safety.
 - c) The corrective action being taken and the projected date of solution.